UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
BIN C15700
Seattle, WA 98115-0070

NMFS Tracking No.:
2001/00064

July 22, 2003

Mr. Daniel Mathis
U.S. Department of Transportation
Federal Highway Administration
Suite 501 Evergreen Plaza
711 South Capitol Way
Olympia, Washington 98501-1284

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation for the SR 24, I-82 to Keys Road Project, Yakima River, WRIA 37, Yakima County, Washington

Dear Mr. Mathis:

Enclosed is a document containing a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of the proposed the SR 24, I-82 to Keys Road Project, Yakima River, WRIA 37, Yakima County, Washington. In this Opinion, NOAA Fisheries concludes that the proposed action is unlikely to jeopardize the continued existence of Middle-Columbia River (MCR) steelhead. As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact of incidental take associated with this action.

This document contains a consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) and its implementing regulations (50 CFR Part 600). NOAA Fisheries concludes that the proposed action may adversely affect designated EFH for salmon. As required by section 305(b)(4)(A) of the MSA, included are conservation recommendations that NOAA Fisheries believes will avoid,

minimize, mitigate, or otherwise offset adverse affects on EFH resulting from the proposed action. As described in the enclosed consultation, 305(b)(4)(B) of the MSA requires that a Federal action agency must provide a detailed response in writing within 30 days of receiving an EFH conservation recommendation.

If you have any questions regarding this letter, please contact Michael Grady of my staff in the Washington Habitat Branch Office at (206) 526-4645 or michael.grady@noaa.gov.

Sincerely,

for

D. Robert Lohn
Regional Administrator

cc: Michael Kulbacki, FHWA

Endangered Species Act – Section 7 Consultation
Biological Opinion
and
Magnuson–Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

SR 24, I-82 to Keys Road Project, Yakima County, Washington (WRIA 37)
NMFS Tracking Number: 2001/00064

Agency: Federal Highway Administration

Consultation Conducted By: NOAA's National Marine Fisheries Service
Northwest Region

Issued by: for D. Robert Lohn Date: July 22, 2003

D. Robert Lohn
Regional Administrator

TABLE OF CONTENTS

1.0 INTRODUCTION

This document transmits NOAA's National Marine Fisheries Service's (NOAA Fisheries) Biological Opinion (Opinion) and Essential Fish Habitat (EFH) consultation based on our review of a project to improve State Route 24 (SR 24) between Interstate 82 (I-82) and Keys Road in Yakima County, Washington. The project includes the replacement of the existing SR 24 bridge across the Yakima River, which is a tributary to the Columbia River. The Yakima River is located in the Middle-Columbia River (MCR) steelhead (*Oncorhynchus mykiss*) evolutionarily significant unit (ESU) and is EFH for chinook (*O. tshawytscha*) and coho (*O. kisutch*) salmon.

1.1 Background Information and Consultation History

The Federal Highway Administration (FHWA) concluded that the project proposed by the lead agency, Washington Department of Transportation (WSDOT), was likely to adversely affect MCR steelhead. Although this project occurs in designated EFH for salmonids, the FHWA did not include a determination of the effect of the project on EFH. The SR 24, I-82 to Keys Road project extends 1.68 miles from the beginning of SR 24 at mile post (MP) -0.15 near Eighteenth Street, in the City of Yakima, to the end of the project at MP 1.53, 0.55 miles west of the SR 24 and the Birchfield Road intersection. The purpose of the project is to improve public safety, reduce travel delays and adverse economic impacts, eliminate scour conditions and increase traffic capacity on SR 24 between I-82 and Riverside Road.

On January 27, 2003, NOAA Fisheries received a Biological Assessment (BA) and a request for formal consultation from the FHWA, which was subsequently given an internal tracking number of WSB-01-010. On February 11, 2003, NOAA Fisheries sent a letter to FHWA requesting additional information related to the proposed project; on March 18, 2003, NOAA Fisheries received a letter from FHWA, which provided supplemental project information. Subsequent requests for additional information were made in electronic mail (e-mails) sent from NOAA Fisheries to FHWA on March 25, April 23, and May 1, 2003. On May 9 and 16, 2003, NOAA Fisheries received e-mails from FHWA which provided the additional information necessary to complete the consultation. This Opinion is based on information provided in the BA, the letter received on March 18, 2003, and e-mails received on May 9 and 16, 2003. Formal consultation was initiated on May 16, 2003.

1.2 Description of the Proposed Action

The FHWA proposes to fund, in whole or in part, a construction project by WSDOT. The proposed project involves improvements to SR 24 between MP -0.15 and MP 1.53, including the replacement of the SR 24 bridge crossing of the Yakima River, in Yakima, Washington.

Between MP -0.15 and MP 0.28 the project will include the following construction components:

1. Expansion of SR 24 from two lanes to four lanes with a center left turn lane;
2. Construction of a new I-82 overpass;

3. Construction of a ten-foot wide pedestrian overpass across I-82;
4. Expansion and realignment of the I-82 off-ramps;
5. Relocation of the SR 24/South 22nd Street intersection approximately 400 feet east of its current location; and
6. Construction of a 450-foot retaining wall along the north side of the realigned section of SR 24.

Between MP 0.28 and MP 1.53 the project will include the following construction components:
7. Construction of a new SR 24 bridge (with an approximately 800-foot long span) across the Yakima River;
8. Demolition of the existing SR 24 bridge across the Yakima River;
9. Expansion of SR 24 from two lanes to four lanes to the Riverside Road intersection;
10. Placement of temporary work platforms in the Yakima River to accommodate bridge construction and demolition activities; and
11. Replacement of the existing 5-foot culvert at Blue Slough with either a bottomless culvert or small bridge.

To allow the new bridge to be completed during year one and the old bridge to be demolished in year two, in-water work will be conducted in the Yakima River between June 1 to September 15 and in Blue Slough between June 1 to November 1, periods when juvenile MCR steelhead are likely to be present in the action area. While these are lengthier in-water work windows than NOAA Fisheries would normally prefer, narrower windows likely would extend construction and demolition activities into second years and, consequently, would increase the risk of harming MCR steelhead and other salmonids from (1) the temporary work bridge washing out during winter flows, or (2) the dismantling and reconstructing of the temporary work bridge(s). The potential adverse impacts on salmon and stream habitat from either of these scenarios would be significantly greater than is expected by allowing construction and demolition during the proposed in-water work period.

1.2.1 Clearing and Grading

The project will result in approximately 15 acres of clearing and grubbing. Most of this area presently lacks woody vegetation. Permanent impacts to riparian vegetation will be limited to the removal of approximately 20 mature black cottonwood trees south of the existing bridge, and an additional 21 mature cottonwood trees will be removed at other locations outside of the riparian zone of the Yakima River. All large trees removed during construction will be retained and subsequently placed in riparian areas as large woody debris (LWD).

1.2.2 Construction of the Temporary Work Platforms

Impact hammer or vibratory pile-driving techniques will be employed to construct two temporary work platforms. One work platform is needed for construction of the new bridge and the other for demolition of the existing bridge. WSDOT estimates that up to 290 temporary steel or wood piles, up to 24 inches in diameter, will be needed to support the temporary work

platforms. Temporary approach embankments will be placed in shoreline areas to provide access to equipment and workers. Work bridge construction will begin on one side of the river by driving piles into place using a pile-driving hammer mounted on a boom crane. After piles are set for a pier, the Contractor will install timber bents and place a section of deck above. The pile-driving hammer will then be moved forward on the bridge deck to drive piles for the next pier. This will be repeated until the temporary bridges span the Yakima River.

1.2.2.1. Work Platform for Constructing the New Yakima River Bridge

The temporary work platform used during construction of the new Yakima River Bridge will be constructed parallel to the new bridge alignment. The temporary work platform will be built on wood or steel piles and will be wide enough to accommodate the equipment necessary for the construction of the new bridge (24 feet or more wide) and will span the width of the river (approximately 600 feet). Finger piers will be built out perpendicular to the primary work platform and parallel to the location of the new bridge footings. These finger piers also will be wide enough to accommodate the equipment needed for construction (24 feet wide or more) and will be approximately 100 feet long. The work platform for the new bridge will require driving up to 165 12-inch and 24-inch diameter piles. The work platform will be removed upon completion of construction activities.

1.2.2.2 Work Platform for Removing the Existing Yakima River Bridge

The most likely method for removing the superstructure of the existing 600-foot long bridge will be the use of support platforms. Support platforms would be placed underneath and along the length of the bridge between the existing piers to support the weight of the superstructure. The work platform for demolition of the old bridge will require driving up to 125 piles. The piles will consist of a combination of 12-inch and 24-inch diameter steel or wood piles. The platform will be removed upon completion of demolition activities.

1.2.3 Construction of the New Yakima River Bridge

1.2.3.1 Bridge Design

WSDOT will construct an 800-foot long bridge across the Yakima River. The bridge will be constructed between the two existing flood-control levees, immediately downstream (south) of the existing SR 24. WSDOT currently is participating in the on-going Yakima County Flood Hazard Zoning District's floodplain restoration planning effort and has delayed the selection of the final design for the new bridge approaches until the planning effort concludes in late 2003. Depending on the outcome of this planning effort, the bridge approaches either will be constructed on a elevated structure or on compacted fill.

1.2.3.2 Shaft Foundations

In-water drilled shaft construction will be done from the temporary work platforms installed in the Yakima River. Steel cylinders about eight to nine feet in diameter will be placed at designated shaft locations and lowered into the Yakima River, acting as cofferdams and containment fields once in the water. A four- to five-foot diameter shaft casing will be placed within the outside cylinders and progressively vibrated or rotated through the substrate. As the casing descends, a clamshell or auger will remove the spoils from within the casing and then place the spoils in trucks located on the temporary work platforms. These trucks would then remove the materials to an approved upland location. The shaft casing length will be extended as the depth of the shaft increases. The shaft casings will be vibrated in initially and then advanced with the excavation. When the final depth has been reached, a concrete seal will be placed between the two casings (outside cylinder and shaft casing) to limit water intrusion. A large rebar-reinforced cage will be placed in the excavated shaft space and concrete will be pumped into the bottom of the shaft. As concrete fills the shaft, the casing will be progressively removed or may remain in place and any purged water from the shaft will be pumped and collected in a Baker Tank, then transported and discharged into an approved location or discharged into lined temporary sedimentation ponds located at least 300 feet from any sensitive resource area. Once the drilled shafts have cured, the bridge columns, crossbeams, and abutments will be formed and poured on the foundation shafts. The steel cylinders will remain in place until the in-water work around the drilled shafts is completed, after which time they will be cut with torches and removed by vibrating and pulling with a crane.

1.2.3.3 Superstructure and Bridge Approaches

Once the shafts, columns, and other substructure elements are completed, girders will be placed and the bridge deck, approach slabs, and traffic barriers will be poured. In addition, the bridge approaches will be constructed (two design options are described below) and the drainage conveyances will be completed. Final steps will include asphalt paving, placing guardrail, and striping the roadway; since these activities do not involve in-water work, they are not restricted to the in-water work period. No riprap will be placed below the ordinary-high-water mark (OHWM) of the Yakima River. However, riprap will be used to stabilize portions of the road embankment down to the 100-year flood elevation.

Two options are being considered for the bridge approaches: (1) compacted-fill, and (2) raised/elevated structures. If a floodplain restoration plan is developed by the Bureau of Reclamation and Yakima County, WSDOT will move forward with elevated approach structures. However, if agreement on a restoration plan is not achieved by January 2004, WSDOT will construct compacted-fill bridge approaches. Because the new approach structures will be located landward of existing flood-control levees, neither of the designs under consideration will affect the existing baseline conditions of the Yakima River.

1.2.4 Demolition of the Existing Yakima River Bridge

The Contractor will be required to complete the demolition of the existing bridge in a way that avoids or minimizes bridge pieces or debris from entering the waters of the Yakima River. The Contractor will be allowed to determine the final "Method of Operation" that will define how all but minor amounts of fine sediment and dust will be contained and not enter the Yakima River. WSDOT has developed a typical method that could be used by the Contractor that would include the following actions to protect the Yakima River. A falsework structure could be constructed on (elevated above) the temporary work platform, and directly beneath the existing bridge. The false work structure should be slightly wider than the existing bridge and include solid wooden rails (containment walls) along the outside edge. As pieces of the existing bridge are broken or sawed off (using grapplers and concrete saws), they will fall a short distance onto the false work structure; the pieces then will be placed into trucks and taken to an approved disposal site(s). To further avoid and minimize the risk of demolition debris entering the Yakima River, a tarp (or similar materials) may be suspended from between the temporary work platform and piers 2, 4, and 5.

While there are several established "construction methods" that the Contractor might use to remove the bridge piers, the most likely method involves the use of excavation grapplers, excavation crushers and boom-mounted air hammers. This equipment is used to break the piers down into pieces that can be disposed of offsite. Any remaining rebar that is exposed above the river bottom elevation will be cut off. Alternatively, the piers may be saw-cut into manageable pieces and then removed from the Yakima River using grapplers.

Two of the five bridge piers (1 and 3) can be removed without working in the flowing waters of the Yakima River. Pier 1 is completely above the ordinary high water line while pier 3 is on an island within the active Yakima River channel. Demolition equipment will be placed on the island in order to complete demolition and removal of one pier (pier 3). Two additional piers (2 and 5) will be removed at a time that approximately half of the pier will be in water. Both of these piers may require the use of temporary work platforms during the demolition phase. However, the proximity of dry land will aid in their removal. The remaining pier (pier 4) is within the flowing waters of the Yakima River and will require removal utilizing equipment operating off of the temporary work. All of the work on pier removal, except for pier 1, will be done during the appropriate summer fish window (June 1 to September 15). Pier foundations will not be removed because of the large quantity of river substrate disturbance that would occur, and the difficulties that would result from the fast-flowing waters in this portion of the Yakima River channel. At the end of bridge demolition phase, three of the piers (2, 4, and 5) will have been removed as close as possible to the river bottom. The other two piers (1 and 3) will have been removed in their entirety or to an elevation where they can be covered with native rock substrates.

1.2.5 Blue Slough Crossings

During the reconstruction of the new four-lane SR 24 highway, the existing Blue Slough crossing will be closed and traffic routed to a temporary detour road crossing that will be constructed approximately 150 to 200 feet north of the existing SR 24 roadway. The in-water work window for installation of both the temporary and replacement crossings in Blue Slough will be restricted to the period from June 1 to November 1; temporary blockage(s) of Blue Slough will be limited to a 45-day period sometime between July 1 to November 1. The new Blue Slough crossing structure will replace the existing 68" wide by 96" high arch culvert with either a corrugated metal pipe, bottomless arch pipe, concrete box culverts, or bridge that will be consistent with the Washington Department of Fish and Wildlife's (WDFW) stream-simulation model. Stream passage will be maintained at all times, except during a maximum 45-day blockage between July 1 and November 1. To avoid and minimize effects on water quality and resident species within Blue Slough, the following mitigation elements will be incorporated within the design: (1) erosion-prevention techniques, (2) channel-bottom protection, (3) proper in-water work-area isolation and monitoring, and (4) vegetating disturbed areas with native species (additional details provided below).

A temporary detour road will be required to cross Blue Slough. A culvert, approximately the same width as Blue Slough, will be placed in the slough slowly to minimize and avoid disturbance to the stream bed. Prior to the placement of the road-fill materials over the culvert, geotextile fabric will be placed over the culvert and surrounding ground. In addition, silt fencing will be installed between the temporary fill materials and Blue Slough to ensure that to avoid and minimize erosion of materials into Blue Slough. Up to 0.41 acre of wetland may be filled for the new crossing structure.

The new Blue Slough crossing structure will be either a corrugated metal pipe, bottomless, concrete box culvert, or bridge. The new structure will be constructed in one of the two following manners:

(1) After the in-water work area has been isolated from stream flows, the roadway will be excavated and the existing culvert removed. The new Blue Slough crossing structure will then be installed and compacted fill placed and graded for the new roadbed. On or before November 1, gravel fill and revetments will be removed from the stream channel, and stream flows redirected back to the natural channel.

(2) A gap will be excavated in the SR 24 road grade adjacent to the existing Blue Slough culvert so that the new crossing structure is constructed in the dry and the existing Blue Slough flows are not disturbed by construction activities. The Blue Slough flows will then be diverted through the new crossing structure, the old culvert removed, and, after isolating the in-water work area and removing fish, the area will be filled with clean road ballast.

1.2.6 Work-area Isolation and Fish Handling

During the construction of drilled shafts, the excavation activities and concrete pours will be isolated from flowing water by cylindrical cofferdams that will effectively isolate the work area from the water. While activities leading up to the placement are likely to scare fish out of the area, there is a potential to trap fish inside during placement of the cylinders. If fish are observed within the cofferdam prior to dewatering, they will be netted and placed outside the dewatered area. As dewatering progresses, visual inspections will be made for captured fish. If any are present, the fish will be identified, enumerated, and released (Appendix 1).

Additional fish handling potentially will occur in during isolation of the in-water work area prior to replacement of the Blue Slough crossing. Prior to the removal and placement of crossing structures in Blue Slough, fish removal and salvage will be conducted by WDFW biologists or other qualified fisheries biologists. To isolate the in-water work area(s), block-nets will be installed both upstream and downstream. The mesh size, length, type of material, and depth of block-nets will vary based on site conditions. Generally, the block-net mesh size will be the same as the seine material (approximately one-quarter inch stretched). Biologists will stretch nets across the wetted channel and "herd" fish out of the work area. Any fish remaining in the work area will be removed using approved electro-shocking techniques (NOAA Fisheries 2000). All captured aquatic life will be immediately placed into five-gallon buckets filled with clean stream water. Water temperatures will be frequently monitored to ensure the specimens are not unduly stressed. Fish will be identified, and enumerated (Appendix 1). After each pass, all fish will be released upstream of the work area. The block-nets will be checked at least once daily to ensure that they are functioning to prevent fish from reentering the work area and will be left in place until all in-water work has been completed.

1.2.7 Construction of Stormwater Facilities

Grass-lined swales, filter strips, and infiltration ditches and ponds will be used where appropriate to treat stormwater runoff. The treatment systems for this project will treat approximately 100% of the new and approximately 40% of the existing impervious surface.

Stormwater systems, culverts, and roadside ditches are being designed to convey the stormwater runoff throughout the project to stormwater treatment facilities and then to stormwater retention facilities. All stormwater that is collected on the bridge and roadway surfaces near aquatic habitats will be conveyed to and placed in stormwater treatment and retention facilities, preventing direct discharges to Blue Slough or the Yakima River.

1.2.8 Site Restoration

1.2.8.1 Riparian Restoration

Upon completion of the project, approximately 0.2 acre of disturbed riparian habitat will be replanted with native grasses and shrubs. In addition, approximately 80 to 100 cottonwood trees will be planted and the trunks and rootwads of salvaged trees (all cut trees greater than six inches diameter at breast height) will be placed as down woody debris in the riparian areas of the Yakima River.

1.2.8.2 Wetland Restoration

The exact amount of wetland fill that will occur is currently uncertain. The extent of wetland impacts could range from none up to 0.48 acre depending on several factors including: (1) the type of crossing structure used at Blue Slough, (2) the bridge-approach option that is selected, and (3) the location of bridge piers. To minimize the adverse effects of the wetland fill, WSDOT will create wetlands at a minimum ratio of two to one (area of wetland creation : area of wetland fill).

1.2.8.3 Streambed Restoration

WSDOT will remove riprap (placed during emergency repair work) from approximately 1,182 square feet of Yakima River streambed in the area around three of the existing bridge piers (piers 2, 3, and 4). Because the new bridge will have drilled shaft foundations (unlike the existing bridge which has spread footings), the need for further emergency repair work will be eliminated.

1.2.9 Project Sequence

The following table provides a schedule of the major activities associated with the SR 24, I-82 to Keys Road project.

Item	Event	Timing
1	Create access for equipment to enter the work areas	Anytime
2	Implement TESC BMPs	Throughout
	In-water work starts	On or after 6/1
3	Work platform for new Yakima River Bridge	6/01 to 9/15
4	Blue Slough Crossings	6/01 to 11/1
5	New bridge construction (in water)	6/01 to 9/15
6	Drilled shafts	6/01 to 9/15
7	Bridge columns, crossbeams and abutments	6/01 to 9/15
8	Dismantle in-water work platform for new bridge	Finish by 9/15
	In-water work stops	Finish by 9/15

9	Place bridge girders (above water)	Anytime
10	Construct and pour bridge deck (above water)	Anytime
11	Finish miscellaneous bridge items, electrical, utility crossings, etc.	Anytime
12	Complete new eastbound lanes (fill and paving)	Anytime
13	Use new eastbound lanes for primary east and westbound traffic	Anytime
14	Construct stormwater system(s) (outside of floodway)	Anytime
15	Use existing fill for new westbound SR 24 fill	Anytime
16	Preliminary demolition of existing SR 24/5 bridge (no in-water work)	Anytime
17	Finish new SR 24 alignment (outside OHWM of river)	Anytime
	In-water work starts	On or after 6/1
18	Build work platform to dismantle existing Yakima River Bridge	On or after 6/1
19	Remove existing 24/5 bridge	6/01 to 9/15
20	Dismantle work platform and remove from river	Finish by 9/15
	In-water work stops	Finish by 9/15
21	Riparian restoration and wetland mitigation activities	ASAP
22	Other miscellaneous items to finish project as required	Anytime

1.3 Description of the Action Area

The action area is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

The action area for this project is defined as the stream channel which includes the water, and land (including submerged land) from approximately 1,700 feet upstream of the existing SR 24 Bridge to approximately 5,000 feet downstream from the new SR 24 Bridge. The action area also includes Blue Slough from 1,000 feet upstream of SR 24 downstream to the Yakima River. Moreover, the action area includes the adjacent riparian zone within the construction area, and all staging areas, catch basins, and roadway approaches.

2.0 ENDANGERED SPECIES ACT BIOLOGICAL OPINION

2.1 Evaluating the Effects of Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402. NOAA Fisheries must determine whether the action is likely to jeopardize the listed species. This analysis involves the initial steps of defining the biological requirements of the listed species, and evaluating the relevance of the environmental baseline to the species' current status.

Subsequently, NOAA Fisheries evaluates whether the action is likely to jeopardize the listed species by determining if the species can be expected to survive with an adequate potential for

recovery. In making this determination, NOAA Fisheries must consider the estimated level of mortality attributed to the collective effects of the proposed or continuing action, the environmental baseline, and any cumulative effects. This evaluation must take into account measures for survival and recovery specific to the listed salmon's life stages that occur beyond the action area.

2.1.1 Status of Species

Middle Columbia River steelhead were listed as threatened under the ESA in 1999 (64 FR 14517). Steelhead of the Snake River Basin are not included in the MCR ESU.

All steelhead in the Columbia River Basin upstream from the Dalles Dam are summer-run, inland steelhead (Chapman *et al.* 1994). Sexually immature steelhead enter fresh water between May and October and their pre-spawning migration can last up to one year. In Washington, steelhead typically spawn between February and June (Busby *et al.* 1996). Depending on water temperature, steelhead eggs may incubate in redds for 1.5 to 4 months before hatching as alevins. Most MCR steelhead smolt at two years and spend one to two years in saltwater before reentering freshwater.

Steelhead require different habitat types during their life history. Spawning generally occurs in the gravel substrates of smaller streams and the side channels of larger rivers (Busby *et al.* 1994). Rearing juveniles utilize a variety of instream cover, including riffles, mid-channel pools, pocket water, overhanging vegetation, and large woody debris (LWD).

Estimates of historical, pre-1960s abundance for the MCR steelhead ESU are only available for the Yakima River. The estimated pre-1960 run size is 100,000 adults (WDF *et al.* 1993). Using the assumption that other basins had comparable run sizes for their drainage areas, the total historical run size for this ESU may have been in excess of 300,000. The most recent five-year average run size (1989–1993) was 142,000 with a naturally produced component of 39,000. These data indicate that approximately 74% of returning adults in this ESU were of hatchery origin (Busby *et al.* 1996). Accordingly, the current natural run size for the ESU might be less than 15% of estimated historic levels.

The current distribution of Yakima Basin steelhead is much more restricted and spatially variable than it was historically. Current steelhead abundance is only about 1.3 to six percent of historical estimates, averaging 1,256 fish (range equals 505 in 1996 to 2,840 in 1988) over brood years 1985 to 2000 (Berg 2001). Except for 1992, abundance has fluctuated around 1,000 adults since 1989 (*op. cit*.).

It is probable that the historical spawning distribution of summer steelhead included virtually all accessible portions of Yakima Basin, with highest spawning densities occurring in complex, multi-channel reaches of the mainstem Yakima and Naches rivers, and in third and fourth order tributaries with moderate gradients (Berg 2001).

While steelhead spawning has not been documented within the action area, the entire lower Yakima is a major overwintering site for steelhead and juvenile spring chinook (Hockersmith *et. al.* 1995.).

2.1.1.1 Population Trends and Risks

For the MCR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.88 to 0.75, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (McClure *et al.* 2001). Furthermore, NOAA Fisheries has estimated the risk of absolute extinction for four of the spawning aggregations, using the same range of assumptions about the relative effectiveness of hatchery fish. At the low end, assuming that hatchery fish spawning in the wild have not reproduced (*i.e.*, hatchery effectiveness equals zero), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Umatilla River and Deschutes River summer runs (McClure *et al.* 2001). Assuming that the hatchery fish spawning in the wild have been as productive as wild-origin fish (hatchery effectiveness equals 100%), the risk of absolute extinction within 100 years ranges from zero for the Yakima River summer run to 1.00 for the Deschutes River summer run (McClure *et al.* 2001).

2.1.2 Biological Requirements

The relevant biological requirements are those necessary for MCR steelhead to survive and recover to naturally reproducing population levels at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance their capacity to adapt to various environmental conditions, and allow them to become self-sustaining in the natural environment.

Biological requirements are defined as properly functioning conditions (PFC) of habitat that are relevant to any steelhead life stage. These habitat conditions include all parameters of the matrix of pathways and indicators described by NOAA Fisheries (1996). Information related to biological requirements for MCR steelhead can be found in Busby *et al*. (1996). Presently, the biological requirements of listed species are not being met under the environmental baseline. The specific biological requirements affected by the proposed action include water quality (*i.e.,* sediment/turbidity) and riparian reserves (*i.e.,* loss of riparian vegetation).

2.1.3 Environmental Baseline

The environmental baseline represents the current set of basal conditions to which the effects of the proposed action are then added. Environmental baseline is defined as "the past and present impacts of all Federal, state, and private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or informal section 7 consultation, and the impact of state or private actions which are contemporaneous with the consultation process" (50 CFR 402.02). The term "action

area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action."

The project area is located partially within the Yakima city limits. Most of the land is currently in private ownership. Commercial development in the vicinity of the project area includes several gas stations, a discount retail store, an arboretum, an animal shelter, an auto wrecking yard, a sewage-treatment plan, and a privately owned campground. A horse riding arena and boarding facility are located on the east side of the Yakima River. Some of the land adjacent to the project area is in agricultural uses.

The Yakima River drains an area of 6,155 square miles and contains about 1,900 river miles of perennial streams. Originating near the crest of the Cascade Range above Keechelus Lake, the Yakima River flows 214 miles southeastward to its confluence with the Columbia at river mile 335.2. The Yakima River Basin lies within areas either ceded to the United States by the Yakama Nation or areas reserved for the use of the Yakama Nation. The Yakama Reservation occupies about 15% of the basin (Ecology 1998). Land use in the basin is dominated by irrigated agriculture, cattle grazing, timber harvest, and recreation (*op. cit*.).

The project area is located within the floodplain of the Yakima River. The project area consists of lowland floodplain with Weirman series soils that are somewhat excessively drained. In the project area, the Yakima River is an incised channel, approximately 20 to 25 feet lower than the surrounding landscape, and has been diked along both sides to prevent flooding of commercial and residential properties in lowland areas (McQueary 2003, Park 2003).

2.1.4 Factors Affecting Species Environment within the Action Area

The Yakima River watershed has experienced past disturbance in all areas, including considerable agriculture-related disturbances. The primary reasons for the decline of steelhead in the Yakima River include: (1) construction of four dams on the Columbia River downstream of the Yakima River; (2). timber practices, degraded riparian and in-stream habitat from urbanization and livestock grazing; (3) large irrigation withdrawals; (4) poorly or totally unscreened irrigation diversions; (5). excessive water temperatures, and (6) overfishing.

These conditions are greatly magnified in the lower Yakima River, creating unfavorable passage for upstream and downstream migrants as well as degraded rearing conditions for juveniles (WDFW 1992).

MCR steelhead have been negatively affected by a combination of habitat alteration and hatchery management practices. The four downstream dams on the Columbia are perhaps the most significant source of habitat degradation for this ESU. The dams act as a partial barrier to passage, kill out-migrating smolts in their turbines, raise temperatures throughout the river system, and have created lentic refugia for salmonid predators. In addition to dams, irrigation systems have had a major negative effect on in-stream flows by diverting large quantities of water, which has resulted in the stranding of fish, and the inability of fish to migrate past

dewatered areas. Other major habitat degradations have occurred through urbanization and livestock grazing practices (WDF *et al.* 1993; Busby *et al.* 1996; NOAA Fisheries 1996; 63 FR 11798).

Habitat alterations and differential habitat availability (*e.g.*, fluctuating discharge levels) impose an upper limit on the production of naturally spawning populations of salmon and steelhead. The National Research Council Committee (NRCC) on Protection and Management of Pacific Northwest Anadromous Salmonids identified habitat problems as a primary cause of declines in wild salmon runs (NRCC 1996). Some of the habitat effects identified were the fragmentation and loss of available spawning and rearing habitat, migration delays, degradation of water quality, removal of riparian vegetation, decline of habitat complexity, alteration of streamflows and streambank and channel morphology, alteration of ambient stream water temperatures, sedimentation, and loss of spawning gravel, pool habitat and large woody debris (NOAA Fisheries 1998, NRCC 1996, Bishop and Morgan 1996).

Hatchery management practices are suspected to be a major factor in the decline of the MCR steelhead ESU. The genetic contribution of non-indigenous, hatchery stocks may have reduced the fitness of the locally adapted native fish through hybridization and associated reductions in genetic variation or introduction of deleterious (*i.e.*, non-adapted) genes. Hatchery fish have been found to directly displace natural spawning populations, compete for food resources, or engage in agonistic interactions (Campton and Johnston 1985; Waples 1991; NOAA Fisheries 1996; 63 FR 11798).

MCR steelhead population sizes are substantially lower than historic levels, and at least two extinctions are known to have occurred in the ESU. Prior to the 1960's, it is estimated that the Yakima River had annual run sizes of 100,000 fish, but in 1996 only 505 adults returned to the basin (WDF *et al.* 1993). The wild fish escapement across the entire ESU has averaged 39,000 and total escapement 142,000 (includes hatchery fish). The large proportion of hatchery fish, concurrent with the decline of wild fish, is a major risk to the MCR steelhead ESU (WDF *et al.* 1993; Busby *et al.* 1996; 63 FR 11798).

Various factors combine to affect water quality in the lower Yakima River. Contributing factors include eroded soil carried to the river via irrigation return or tributaries affected by irrigation runoff, sand and gravel mining, urban runoff, erosion from construction sites, road building, forestry practices, and natural causes (Ecology 1998). As a result, the lower Yakima River has been placed on the State's 303(d) list for impaired water bodies. The Washington Department of Ecology (Ecology) has determined that turbidity, DDT, DDE, mercury, pH, dissolved oxygen, instream flow, and excessive temperature represent key water quality impairments in the lower Yakima River.

Several factors combine to adversely affect the species habitat within the action area. The project area is located where a system of flood-protection levees has significantly constricted the floodplain, resulting in elimination of important over-bank habitats and degradation of remaining in-stream habitat conditions. Moreover, the current SR 24 Yakima River Bridge pier

foundations are being undercut by stream flows, resulting in an ongoing need to place riprap around footings to prevent catastrophic failure, and which results in further degradation of in-stream habitat conditions.

2.2 Effects of the Proposed Action

The ESA implementing regulations define "effects of the action" as "the direct and indirect effects of an action on the species together with the effects of other activities that are interrelated or interdependent with that action, that will be added to the environmental baseline." Indirect effects are those that are caused by the proposed action, are later in time, but are still reasonably certain to occur (CFR 402.02).

The proposed project would replace an existing bridge with a new bridge that will facilitate significant improvements in channel dynamics, water flow, and floodplain connectivity. As such, the primary effects of the project are the direct effects of the construction activities required to replace the existing bridges.

The proposed SR 24, I-82 to Keys Road Project is likely to adversely affect MCR steelhead (FHWA 2003). The segment of the Yakima River flowing through the action area provides rearing habitat for juvenile steelhead and spring chinook.

2.2.1 Direct Effects

Direct effects result from the agency action and include the effects of interrelated and interdependent actions. Future Federal actions that are not direct effects of the action under consideration (and not included in the environmental baseline or treated as indirect effects) are not evaluated. The direct effects of the proposed bridge replacement project activities are discussed below.

2.2.1.1 Fish Handling

During the construction of drilled shafts, the excavation activities and concrete pours will be isolated from flowing water by cylindrical cofferdams that will effectively isolate the work area from the water. While activities leading up to cofferdam placement are likely to scare fish out of the area, there is a potential to trap fish inside during placement of the cylinders. If fish are observed within the cofferdam prior to dewatering, they will be netted and placed outside the dewatered area. As dewatering progresses, visual inspections will be made for captured fish. If any are present, the fish will be netted and removed. Timing restrictions reduce the likelihood that listed species will be present during in-water work because outmigration is almost complete and few juvenile steelhead are seen past June 30 (YKFP).

Additional fish handling may occur during when the Blue Slough in-water work area is isolated to install the new crossing structure in Blue Slough. To minimize the potential effects, an experienced fishery biologist will supervise work-area isolation and fish-moving operations.

2.2.1.2 Water Quality

The project involves several construction activities that can increase the amount of sediment delivered to the river. These activities include, removal of the existing bridge, installation of new piers, and replacement of the Blue Slough crossing structure. To address these issues, the proposed action includes measures that will reduce or avoid the effects described below.

For salmonids, turbidity has been linked to a number of behavioral and physiological responses (*e.g.*, gill flaring, coughing, avoidance, increase in blood sugar levels) which indicate some level of stress (Bisson and Bilby 1982, Sigler *et al.* 1984, Berg and Northcote 1985, Servizi and Martens 1987). The magnitude of the stress responses is generally higher when turbidity is increased and particle size is decreased (Bisson and Bilby 1982, Servizi and Martens 1987, Gregory and Northcote 1993). Although turbidity may cause stress, Gregory and Northcote (1993) have shown that moderate levels of turbidity accelerate foraging rates among juvenile chinook salmon, likely because of reduced vulnerability to predators due to camouflaging.

When the particles causing turbidity settle out of the water column, they contribute to sediment on the riverbed (sedimentation). When sedimentation occurs, salmonids may be negatively impacted in the following ways: (1) salmonid eggs may be buried and suffocated; (2) prey habitat may be displaced; and (3) future spawning habitat may be displaced (Spence *et al.* 1996).

The proposed project will cause elevated turbidity levels during the construction (including demolition) period and for several days afterwards. However, the effects of this turbidity on MCR steelhead will be minimized by (1) the installation of silt fences before construction begins, (2) the use of temporary sediment ponds, and (3) constructing new bridge columns within cofferdams. It is also expected that MCR steelhead present during the initial phases of construction would temporarily move to refuges where turbidity can be avoided, thus preventing injury or death. Additionally, the project in-water work window (*i.e.*, June 1 to September 15 for the mainstem Yakima River and June 1 to November 1 for Blue Slough) will capitalize on a time of year when the fewest number of adult and juvenile MCR steelhead are present in the Union Gap sub-basin and when there is the least amount of migratory movement by salmonids. Overall, the increased turbidity and sediment are not expected to influence the environmental baseline over the long term.

2.2.1.3 Streambed Disturbance

Project construction includes the installation and removal of piles for a temporary work platforms, removal of the old bridge piers, and installation of the new bridge shaft foundations. These activities will disturb the substrate of the Yakima River.

In-stream work may harm fish by homogenizing the substrate. Moreover, reducing the diversity of benthic habitat in the river will cause a temporal loss of macroinvertebrate habitat. Aquatic invertebrates serve as an important source of prey for salmonids, and the loss of aquatic invertebrate habitat may reduce foraging opportunities for listed salmonids. Effects associated

with the disruption of the streambed are likely to be short-lived as invertebrates tend to rapidly recolonize disturbed areas (Allan 1995).

To minimize the disturbance of the river bed, the Contractor will complete all in-water work during the previously described in-water work window. Moreover, WSDOT will improve approximately 1,182 square feet of streambed habitat through the removal of riprap around existing Bridge Piers 2, 3, and 4.

NOAA Fisheries expects that the streambed disturbance caused by this action would be short-lived, returning to baseline condition soon after construction is completed. Furthermore, NOAA Fisheries expects that long-term impacts would not occur. Other than the short-term impacts mentioned above, this project would not change or add to the existing baseline streambed condition within the lower Yakima River.

2.2.1.4 Loss of Functional Streambed Habitat

Between 300 and 500 square feet of streambed habitat will be permanently lost from the construction of new bridge columns. To minimize the loss of streambed habitat function, WSDOT will restore 1182 square feet of streambed habitat by removing existing riprap from the Yakima River streambed in the areas around existing bridge piers 2, 3, and 4. Moreover, the new bridge will have drilled shaft foundations (as opposed to spread footings of the existing bridge) that will eliminate the need for further emergency repair work.

2.2.1.5 Loss of Functional Riparian Habitat

The project includes activities that call for removing existing riparian vegetation. To address the environmental results of removing vegetation, the project includes new riparian plantings in the action area.

The permanent loss of 0.02 acre of riparian habitat (as a result of constructing bridge columns) and clearing of approximately 20 mature black cottonwood trees within the riparian zone of the Yakima River will negatively affect habitat functions. Riparian zones provide numerous functions essential to the maintenance of habitat conditions conducive to salmonid survival. Riparian areas provide a variety of important hydrologic functions, such as groundwater recharge, baseflow maintenance, and floodwater detention. Moreover, riparian vegetation limits the rate of erosion and sediment delivery, and provides thermal moderation. Riparian vegetation also provides a source of large woody debris (LWD) and bank stability that is vital in creating and maintaining channel complexity, sediment storage sites, large pools, and cover. Finally, riparian vegetation also contributes allochthonous energy inputs, and is an important source of nutrients in many stream systems.

Stream-side vegetation contributes to channel stability through root strength and channel roughness and its loss can lead to bank collapse. Riparian trees within one tree height of channel margins are a direct source of LWD to fish habitat. Additional LWD may be recruited to the

stream as channels meander across the floodplain, capturing LWD that was previously in the dry. LWD contributes to the formation of large pools, channel complexity, and cover. Riparian vegetation typically contributes to stream shading, thereby reducing stream temperatures.

All areas disturbed during construction will be replanted with native vegetation. All removed trees with a diameter greater than six inches will be replaced with native trees and shrubs representative of riparian habitats in the action area. Moreover, all large cottonwood trees removed during construction will be retained and subsequently placed in riparian areas as large woody debris. As discussed above (section 2.1.3.2.3), more detailed mitigation plans will be developed during the permitting stage.

2.2.1.6 Pile Driving/Percussive Impacts

This project will include the installation of up to 290 steel pilings. To minimize effects, the project will include timing restrictions, operation of the pile driving equipment in a prudent manner, and the use of hydroacoustic monitoring to determine sound levels.

The greatest potential impact from pile driving is from the underwater sound pressure waves that originate when an impact pile hammer contacts the top of a steel pile. The impact of the hammer on the top of the pile causes a wave to travel down the pile and causes the pile to resonate radially and longitudinally. Based on the known range of salmonid hearing, pile-driving noise would be expected to be heard by salmonids within 600 meters of the noise source, although salmonids at this range may not exhibit any visible response (Feist *et al.* 1992). Impact pile driving can generate sound pressure levels in excess of 192 dB (re: 1 µPa), which is above the 180 dB (re: 1 µPa) shown to damage the inner ear of a non-salmonid fresh-water fish (Hastings *et al.* 1996).

Between 440 and 4,440 meters from an active pile driving operation, sound pressure levels are predicted to attenuate from 189 dB (re: 1 µPa) to approximately 150 dB (re: 1 µPa), respectively. Within this area, listed salmonids may exhibit temporary abnormal behavior indicative of stress or exhibit a startle response, but not sustain permanent harm or injury. However, there is some uncertainty about the potential for injury to fish from sound pressure levels in this range, because Hastings (cited in NOAA Fisheries 2001) has information that suggests damage to the inner ear may occur at levels greater than 150 dB (re: 1 µPa). Hasting (*op. cit.*) concludes that 150 dB (re: 1 µPa) is a safe upper limit for relatively short exposures.

Adverse effects from pile driving associated with the proposed action are expected to be minimal to adult MCR steelhead because of the timing restrictions imposed for this activity. However, timing restrictions will not minimize impacts to juvenile MCR steelhead, which likely will be rearing within the action area. To minimize the adverse effects of pile driving on juvenile MCR steelhead, onsite monitoring will be conducted during the initial pile-driving operations to measure the overpressure readings and submit a report to the regulatory agencies. All instream pile-driving activities will be completed during the instream work window (June 1 to September 15). Vibratory hammers will be used for temporary piling removal and driving of any opened

pile when ever possible.

2.2.2 Indirect Effects

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur (50 CFR 402.02). Indirect effects include public and private actions and can occur outside of the area directly affected by the action. Indirect effects can include other Federal actions that have not undergone section 7 consultation but will result from the action under consideration. These actions must be reasonably certain to occur, or be a logical extension of the proposed action. The indirect effects of the SR 24, SR 82 to Keys Road Project are discussed below.

2.2.2.1 Loss of Wetlands

The project includes activities that will result in the filling of wetlands. To address the environmental consequences of the loss of wetlands, the project will create new wetlands in the action area.

Wetlands provide many important functions including water-quality improvement, groundwater recharge, flood desynchronization, stream base-flow augmentation, and food-chain support (Hruby *et al.* 1999, 2000; Mitsch and Gosselink 2000; Null *et al.* 2000), which can significantly contribute to proper stream system function.

The amount of wetland fill required to construct the project will vary depending upon (1) the bridge-approach option selected, (2) the ultimate location of the bridge piers, and (3) the type of stream crossing over Blue Slough. Under the "worst-case" scenario, up to 0.48 acre of jurisdictional wetlands would be filled. However, if elevated bridge approaches are constructed, piers are located outside of wetlands, and a clear-span bridge is constructed across Blue Slough, no wetland fill will occur. Approximately 0.1 acre of the potential wetland fill lies waterward of flood-control levees and, consequently, is accessible to salmonids during high stream flows. The remaining 0.38 acre of potential wetland fill is located landward of flood-control levees and, consequently, is inaccessible to salmonids.

To minimize the adverse effects of the wetland fill, WSDOT will create wetlands at a minimum of a ratio of two to one.

2.2.2.2 Floodplain Connectivity

Blue Slough is a relict side channel that is maintained as an irrigation delivery canal, which for much of its length provides good rearing habitat. The project will replace an existing five-foot diameter culvert at the Blue Slough crossing with either a large bottomless culvert or a small bridge. Consequently, the project will improve connectivity between Blue Slough and the Yakima River. The new 800-foot long bridge will maintain the existing baseline condition for floodplain connectivity of the Yakima River.

2.2.2.3 Streambed Scour

The removal of the existing bridge will significantly reduce maintenance requirements for this river crossing. The existing bridge has had an on-going scour problem that has required multiple emergency repairs. The new bridge will have drilled shafts instead of spread footings. This should eliminate the almost yearly maintenance activities in the vicinity of this bridge. Although there may be temporary modifications to river hydrology, it is anticipated that the new bridge will create less resistance and eliminate the severity of the scour problem.

2.2.2.4 Stormwater

The project will result in an increase in the amount of impervious surface in the action area. To address the environmental effects of impervious surface, the project proposes to treat the runoff generated from the new impervious surface.

Several adverse effects are associated with adding impervious surface, such as roads, to a watershed. Those adverse effects are described in further detail below. The extent to which steelhead experience adverse effects associated with impervious surfaces depends on several factors. Impervious surfaces can affect steelhead by degrading water quality, water temperature, and/or hydrology of stream habitat. Stormwater treatment facilities and other techniques can reduce the adverse effects of those changes if they are incorporated into the project.

Impervious surfaces affect the watershed in several ways. The addition of impervious surface will result in increased stormwater runoff and alteration of existing drainage patterns in the action area. Such effects to hydrology typically include increased frequency and duration of peak flows and the presence of peak flows during periods when none previously existed. Increased impervious area also can shift the hydrologic regime from subsurface to surface runoff and may result in higher and more frequent peak flows even with small storms. In headwater streams, increased peak flows and increased frequency and duration of peak flows can adversely alter steelhead habitat through lateral erosion, bed scour, downcutting, bank de-stabilization, and removal of woody debris. In addition, increased peak flows can lead to reduced groundwater recharge, which, in turn, can result in decreased base flows in smaller stream systems. Decreased base flows may create migration barriers, strand fish in disconnected habitats, and increase stream temperatures.

Research indicates a negative relationship between impervious surface and water quality associated with stormwater runoff (Schueler 1984). In urban areas, roads act as conduits of stormwater runoff and pollutants from impervious areas directly to streams. May *et al*. (1997) discussed declines in biological integrity and habitat quantity and quality as the level of impervious surface area increased above five percent. Large rainstorms and subsequent high flows can elevate total suspended solids, turbidity, and nutrient concentrations in urban watersheds. Additionally, chemical water quality generally declines as urbanization increases (May *et al*. 1997). Increased impervious surface also contributes to water temperature increases in streams (Schueler 1984). The addition of impervious surface to the watershed, including

riparian areas, will also result in a permanent loss of opportunity for revegetation in the areas where those surfaces are added.

The proposed road project will increase the impervious surface area within the action area by approximately 357,000 square feet. However, the proposed project will avoid or minimize adverse changes in hydrology by creating stormwater treatment facilities designed to treat approximately 140% of the runoff generated from the project. Stormwater systems, culverts, and roadside ditches are being designed to convey the storm water runoff throughout the project to stormwater treatment and detention facilities. No stormwater will be allowed to enter the Yakima River or Blue Slough directly. While final design and quantities have not been determined, current plans include the use of stormwater detention and/or infiltration systems. Up to two detention/infiltration systems may be needed; one system would be located on the west side of the Yakima River Bridge on the south side of SR24 and one on the east side of the Yakima River Bridge north of SR 24 and east of Keys Road. However, a more sophisticated system, which discharges some of the treated stormwater to the Yakima River, might be investigated as the project design is further developed. However, the effect to water quality would be the same as under the aforementioned system.

Presently, there is not a baseflow problem in this stretch Union Gap sub-basin of the Yakima River. From August through October, the period during which baseflow problems could naturally emerge, the river channel within the action area carries much higher than natural flows primarily to satisfy 3,300 cfs worth of irrigation withdrawals four to five miles downstream. The Bureau of Reclamation (BOR) supplements natural flows from storage to meet those diversion demands and, depending on water supply, leave 300 to 600 cfs in the river below the lower of the two diversions (Sunnyside Dam). To the extent that baseflows were impacted by a lack of stormwater retention or wetland fill, the BOR would manage the river to hit the minimum flow below Sunnyside Dam. Consequently, NOAA Fisheries believes that the new impervious surface from the proposed project will have an insignificant and discountable affect on baseflows in the Yakima River. In addition, the proposed treatment facilities will avoid and minimize the potential effects of stormwater on water quality in the Yakima River.

2.2.3 Effects of Interrelated and Interdependent Actions

The effects of interrelated effects include effects from actions that are a part of the larger action and depend on the larger action for their justification.

As a result of the SR 24 project, Yakima County will realign South 33rd Street onto Riverside Road to provide access onto SR 24. Yakima County has prepared a draft BA for the South 33rd Street Phase 2 project (South 33rd Project). The final BA for the South 33rd Project will be submitted shortly, and it is anticipated that the BA will have a determination of "No Effect" on ESA-listed species. The effects of these projects will be analyzed in subsequent consultations. The South 33rd Project has been modified so that it is farther away from the Yakima River and does not cross Blue Slough. The SR 24 and the South 33rd Project will be constructed concurrently. No effects from interrelated or interdependent actions are foreseen between the

SR 24 project and the Yakima County South 33rd project.

2.2.4 Population Scale Effects

As discussed previously (section 2.1.1.1), the risk of extinction in the next 100 years of MCR summer-run steelhead in the Yakima River is zero. However, the proposed action will have short-term (construction-related) adverse affects on water quality, in-stream habitat, and riparian reserves. In the long term, however, the project will result in incremental, beneficial affects on floodplain connectivity and in-stream habitat. Additionally, the timing and duration of in-stream work activities will minimize the affects on MCR steelhead. Therefore, the proposed action is unlikely to influence the pre-project lambda estimates.

2.2.5 Cumulative Effects

Cumulative effects are defined as "those effects of future state or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation" (50 CFR 402.02).

Cumulative effects to steelhead from the foreseeable future state and local activities affecting the Yakima River and its shoreline area are anticipated to be limited. The Yakima County Flood Hazard Zoning District is currently investigating the feasibility of restoring floodplain along the left (east) bank downstream of the existing SR 24 alignment. The optimum restoration opportunity that could be obtained occurs adjacent to the left bank highway abutment where the existing levee may be set back from the Yakima River channel. At this time, it is uncertain when or if any floodplain restoration projects might occur.

2.3 Conclusion

The proposed action is not likely to jeopardize the continued existence of MCR steelhead. There will be short-term direct impacts associated with the proposed activities. Demolition and construction activities will result in temporary increases of sediment and turbidity levels. However, potential adverse effects will be minimized through the use of Best Management Practices in the design and construction. The bridge replacement will increase the amount of over-water structure above the Yakima River. Overall, the proposed activities are not expected to appreciably reduce the likelihood of survival and recovery of MCR steelhead. The determination of no jeopardy was based on the following factors: (1) timing restrictions related to in-water construction will minimize impacts to fish and their habitat, (2) removal of the old bridge will improve habitat conditions for all life stages of salmonids and will improve channel morphology, (3) the installation of stormwater facilities will minimize the effects of increased impervious surface added to the Yakima watershed, and (4) riparian vegetation removal will be minimized and replaced. NOAA Fisheries concludes that the proposed action is not likely to impair properly functioning habitat or appreciably reduce the functioning of already impacted habitat. Furthermore, NOAA Fisheries concludes that the proposed action is unlikely to influence existing population trends or risks in the action area. Overall, the proposed activities

are not expected to appreciably reduce the likelihood of survival of MCR steelhead.

2.4 Reinitiation of Consultation

Consultation must be reinitiated if the extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; new information reveals effects of the action may affect listed species in a way not previously considered; the action is modified in a way that causes an effect on listed species that was not previously considered; or, a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

2.5 Incidental Take Statement

Section 9 of the ESA and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. "Take" is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. Harm is further defined as significant habitat modification or degradation that results in death or injury to listed species by "significantly impairing behavioral patterns such as breeding, spawning, rearing, migrating, feeding, and sheltering" (50 CFR 222.102). Incidental take is take of listed animal species that results from, but is not the purpose of, the Federal agency or the applicant carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to, and not intended as part of, the agency action is not considered prohibited taking provided that such takings is in compliance with the terms and conditions of this incidental take statement.

An incidental take statement specifies the effects of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize take and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.5.1 Amount or Extent of Take Anticipated

MCR steelhead are likely to express one of several life histories in the action are during any day of the year. As such, they are likely to be in the action area when project effects are manifest and therefore take of MCR steelhead is reasonably certain to occur. The exact numerical amount of take is difficult if not impossible to quantify. In such cases where NOAA Fisheries finds take to be unquantifiable, the extent of effects on habitat in the action area are analyzed as a surrogate for the amount of anticipated take.

Take is reasonably certain in the form of harm or habitat modification to an extent that impairs normal behaviors including spawning, feeding, sheltering, and migrating. The mechanisms of harm for proposed project activities include work in the water, isolation of in-water work areas, pile driving, temporary construction effects including sediment mobilization, vegetation removal, and hydrologic changes related to increased impervious surface. The extent of these activities is analyzed in this Opinion and are a surrogate for the extent of take that is anticipated

to result from project activities. The anticipated extent of take from each is summarized below.

1. Water quality impairment: That which would occur from the clearing of approximately one acre in the 100-year floodplain of the Yakima River. That which would occur from in-water construction activities, including the driving and subsequent removal of both cofferdams and steel piles, the demolition of the existing bridges, and the removal of the railroad bridge piers for up to 300 feet downstream from the point of disturbance. That which would occur from the net increase of approximately 357,000 square feet of new impervious surface.

2. Benthic productivity: That which would occur from permanent loss of up to 500 square feet of streambed habitat from the construction of new bridge columns. That which would occur from temporary loss of up to 7,000 square feet of streambed.

3. Pile driving: That which would occur from 290 steel piles over a period of four weeks.

4. Predation Opportunity: That which would occur from a net increase of 23,100 square feet and a temporary increase of approximately 26,400 square feet of over-water structure.

5. Riparian and wetland habitat loss: That which would occur from the cutting of up to 21 cottonwood trees in riparian areas and filling of up to 0.48 acre of wetland.

2.5.2 Reasonable and Prudent Measures

The NOAA Fisheries believes that the following reasonable and prudent measures (RPM) are necessary and appropriate to minimize incidental take of MCR steelhead:

1. The FHWA will minimize the amount and extent of incidental take from construction activities by taking measures to limit the timing, duration, and extent of construction within the OHWM.

2. The FHWA will minimize the amount and extent of incidental take from isolation and fish handling by taking measures that ensure prudent methods are used that will minimize risk of injury to listed species.

3. The FHWA will minimize the amount and extent of incidental take from construction activities in or near the Yakima River, by developing and implementing effective erosion and pollution control measures throughout the area of disturbance and for the life of the project. The measures shall minimize the movement of soils and sediments both into and within the Yakima River and Blue Slough, and stabilize bare soil over both the short and long term.

4. The FHWA will minimize the amount and extent of take from loss of instream habitat, by taking measures to minimize impacts to riparian and instream habitat, or where impacts are unavoidable, to replace or restore lost riparian and instream habitat function.

5. The FHWA will ensure the effectiveness of implementation of the RPMs, the erosion control measures, and plantings for site restoration by monitoring and evaluating both during and following construction, and meet criteria as described below in the terms and conditions.

2.5.3 Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the FHWA must ensure that WSDOT complies with the following terms and conditions, which implement the RPMs described above. Implementation of the terms and conditions within this Opinion will further reduce the risk of impacts to MCR steelhead. These terms and conditions are non-discretionary.

1. To implement RPM No. 1 (construction within the OHWM) above, the FHWA shall ensure that:

   1.1 All work within the active channel of the Yakima River is completed between June 1 and September 15. All in-water work in Blue Slough is completed between June 1 and November 1, and that blockages to fish passage will be limited to a 45-day period between July 1 and November 1. Any additional extensions of the in-water work period are first approved by and coordinated with NOAA Fisheries and WDFW.

   1.2 Planned alteration or disturbance of streambanks and existing riparian vegetation are minimized to the extent described in the BA and other supplemental information provided by WSDOT and FHWA to NOAA Fisheries.

   1.3 All water intakes used at in-water work areas in both the Yakima River and Blue Slough are screened and maintained according to NOAA Fisheries' fish screen criteria.[1]

   1.4 To implement RPM No. 1, the FHWA shall ensure that:

      (1) A plan is developed and implemented for hydroacoustic monitoring of the peak and root-mean-squared (rms) sound pressure levels generated during impact-driving of steel piles. The plan shall be reviewed and approved by NOAA Fisheries. No monitoring or sound attenuation measures will be required for piles driven in the dry, vibratory driving of any type of pile, or impact driving of wood piles. During hydroacoustic monitoring, the hydrophone shall be positioned at mid-depths, 10 meters distant from the pile being driven.

         (a) If sound pressure levels exceed 150 dBrms (re: 1 μPa)(0.032 KPa) for fewer than 50% of the impacts and never exceed 180 dBpeak (re: 1 μPa)(1 KPa), pile driving may proceed without further restriction; or

[1] NOAA Fisheries, Juvenile Fish Screen Criteria (revised February 16, 1995) and Addendum: Juvenile Fish Screen Criteria for Pump Intakes (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

(b) If rms sound pressure levels exceed 150 dB for 50% or more of the impacts, or peak pressures ever exceed 180 dB, pile driving may continue, but only with the use of a bubble curtain or another sound-attenuation device pre-approved by NOAA Fisheries.

(i) The initial hydroacoustic monitoring to establish the sound pressure levels being produced will not be required if the approved sound-attenuation device is used for all piles.

(ii) If a sound-attenuation device is deployed, the level of sound attenuation will be determined through hydroacoustic monitoring according to a plan to be developed by the FHWA and submitted for approval by NOAA Fisheries.

(2) Measures will be taken to prevent demolition and/or construction debris from entering the Yakima River.

2. To implement RPM No. 2 (isolation and fish handling), the FHWA shall ensure that:

2.1 The work area is isolated from the flowing stream using the measures described in the BA and which are incorporated here by reference.

2.2 A fishery biologist experienced with work-area isolation ensures the safe handling of all ESA-listed fish and conducts or supervises all capture-release operations.

2.3 The capture team handles ESA-listed fish with extreme care, keeping fish in-water to the maximum extent possible during capture and transfer procedures to prevent the added stress of out-of-water handling.

2.4 Captured fish are released as near as possible to the capture area.

2.5 ESA-listed fish are not transferred to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.

2.6 Other state permits necessary to conduct the capture and release activity are obtained.

2.7 NOAA Fisheries or its designated representative is allowed to accompany the capture team during the capture and release activity, and must be allowed to inspect the capture team's capture and release records and facilities.

2.8 The capture team completes the In-water Construction Monitoring Report form (Appendix 1) for all salmonids encountered during isolation and fish-movement operations. The FHWA submits to NOAA Fisheries (Washington Branch) a monitoring report with the results of the monitoring by December 31 of the year following the

completion of construction.

3. To implement RPM No. 3 (construction activities), the FHWA shall ensure that all temporary erosion and sediment control (TESC) and pollution control measures included in the BA and other written correspondence from WSDOT and/or FHWA are included as special provisions in the contract. NOAA Fisheries requires the FHWA to pay particular attention to preparation of a TESC plan as follows: A TESC plan will be prepared by the FHWA, WSDOT, or the Contractor and implemented by the Contractor. The TESC plan will outline how and to what specifications various erosion control devices will be installed to meet water quality standards, and will provide a specific inspection protocol and time response. Erosion control measures shall be sufficient to ensure compliance with applicable water quality standards and this Opinion. The TESC plan shall be maintained on site and shall be available for review upon request. FHWA shall also ensure that:

   3.1 Construction within the project vicinity does not begin until all temporary erosion controls are in place. Erosion control structures are maintained throughout the life of the contract.

   3.2 All exposed areas are replanted with a native seed mix.

   3.3 All equipment used for in-water work is cleaned prior to entering the active channel of the Yakima River. External oil and grease will be removed. Untreated wash and rinse water is not discharged into streams and rivers without adequate treatment.

   3.4 Material removed during excavation is only placed in upland locations and shall be prevented from eroding into the Yakima River.

   3.5 Shall preclude demolition debris from entering the river. Any material that falls into the Yakima River during construction operations is removed in a manner that has a minimum impact on the streambed and water quality.

   3.6 The Contractor develops an adequate, site-specific Spill Prevention and Countermeasure or Pollution Control Plan (PCP), and is responsible for containment and removal of any toxicants released. FHWA will monitor the Contractor to ensure compliance with this PCP.

   3.7 Areas for fuel storage, refueling, and servicing of construction equipment and vehicles are at least 150 feet from the stream channel and all machinery fueling and maintenance occurs within a contained area. Overnight storage of vehicles and equipment occurs only in designated staging areas.

   3.8 No surface application of nitrogen fertilizer is used within 50 feet of any water of the State of Washington.

4. To implement RPM No. 4 (riparian habitat protection), the FHWA shall ensure that:

    4.1 All disturbed areas are planted with a native seed mix, and native shrubs and trees.

    4.2 The boles and root wads of all felled cottonwood trees (≥8 inches diameter at breast height) are salvaged and distributed in riparian areas.

5. To implement RPM No. 5 (monitoring), the FHWA shall ensure that:

    5.1 Erosion control measures as described above in Term and Condition No. 3 are monitored.

    5.2 All riparian plantings are monitored yearly for three years to ensure that finished grade slopes are at stable angles of repose and that woody plantings are achieving a minimum of 80% cumulative survival.

    5.3 If the success standard specified above in Term and Condition No. 5.2 is not achieved, dead plantings are replaced to bring the site into conformance. If failed plantings are deemed unlikely to succeed, replacement plantings are conducted at other appropriate locations in the project area.

    5.4 Within 60 days of completing the hydroacoustic monitoring for each temporary work platform, a report shall be submitted to NOAA Fisheries, Washington Habitat Branch, Lacey, Washington. The report shall include a description of the monitoring equipment and for each pile monitored, the peak and rms sound pressure levels with and without a bubble curtain, the size of pile, the size of hammer and the impact force used to drive the pile, the depth the pile was driven, the depth of the water, the distance between hydrophone and pile, and the depth of the hydrophone.

    5.5 By December 31 of the year following the completion of construction, the FHWA submits to NOAA Fisheries (Washington Habitat Branch) a monitoring report with the results of the monitoring required in terms and conditions 5.1 and 5.2 above.

    5.6 In each of the two years following completion of construction, the FHWA submits to NOAA Fisheries (Washington Habitat Branch) a monitoring report with the results of monitoring requirements of 5.3.

3.0 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

3.1 Background

The Magnuson-Stevens Fishery Conservation and Management Act (MSA), as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries

management plan. Pursuant to the MSA:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2));
- NOAA Fisheries must provide conservation recommendations for any Federal or state activity that may adversely affect EFH (§305(b)(4)(A));
- Federal agencies must provide a detailed response in writing to NOAA Fisheries within 30 days after receiving EFH conservation recommendations. The response must include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency must explain its reasons for not following the recommendations (§305(b)(4)(B)).

Essential Fish Habitat means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting this definition of EFH: waters include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; substrate includes sediment, hard bottom, structures underlying the waters, and associated biological communities; necessary means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110). Adverse effect means any impact which reduces quality and/or quantity of EFH, and may include direct (*e.g.*, contamination or physical disruption), indirect (*e.g.*, loss of prey or reduction in species fecundity), site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions (50 CFR 600.810).

Essential Fish Habitat consultation with NOAA Fisheries is required regarding any Federal agency action that may adversely affect EFH, including actions that occur outside EFH, such as certain upstream and upslope activities.

The objectives of this EFH consultation are to determine whether the proposed action would adversely affect designated EFH and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH.

3.2 Identification of Essential Fish Habitat

Pursuant to the MSA the Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Federally managed Pacific salmon: chinook; coho, and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC 1999), and longstanding, naturally impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and

identifications of EFH for salmon are found in Appendix A to Amendment 14 to the Pacific Coast Salmon Plan (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based, in part, on this information.

3.3 Proposed Actions

The proposed project is detailed above in Sections 1.3 and 1.4 of this document. The project encompasses habitats that have been designated as EFH for various life-history stages of chinook and coho salmon.

3.4 Effects of Proposed Actions

As described in detail in section 2.1.3 of this document, the proposed project may result in detrimental short-term impacts to a variety of habitat parameters. These adverse effects are:

- Short-term degradation of water quality in the action area due to an increase in turbidity and contaminants during construction.

- Temporary risk of contamination through the accidental spill or leakage of petroleum products from heavy equipment. Short-term degradation of habitat due to removal of riparian vegetation.

- Temporary reduction of riparian vegetation and recruitment of woody debris through the removal of native plant species.

- Temporary degradation of benthic habitat due to in-water construction.

3.5 Conclusion

NOAA Fisheries believes that the proposed actions may adversely affect EFH for chinook and coho salmon.

3.6 Essential Fish Habitat Conservation Recommendations

Pursuant to Section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations to Federal agencies regarding actions that would adversely affect EFH. While NOAA Fisheries understands that the conservation measures described in the BA will be implemented by the WSDOT, it does not believe that these measures are sufficient to address the adverse impacts to EFH described above. Consequently, NOAA Fisheries recommends that FHWA implement the following conservation measures to minimize the potential adverse effects to EFH for chinook and coho salmon:

1. The work area is isolated from the flowing stream using the measures described in the BA and which are incorporated here by reference.

2. Construction within the project vicinity should not begin until all temporary erosion controls are in place. Erosion control structures should be maintained throughout the life of the contract.
3. All exposed areas should be replanted with a native seed mix.
4. All equipment used for in-water work should be cleaned prior to entering the active channel of the Yakima River. External oil and grease will be removed. Untreated wash and rinse water should not be discharged into streams and rivers without adequate treatment.
5. Material removed during excavation should only be placed in upland locations and should be prevented from eroding into the Yakima River.
6. Demolition debris should be precluded from entering the river. Any material that falls into the Yakima River during construction operations should be removed in a manner that has a minimum impact on the streambed and water quality.
7. The Contractor should develop an adequate, site-specific Spill Prevention and Countermeasure or Pollution Control Plan (PCP), and should be responsible for containment and removal of any toxicants released. FHWA should monitor the Contractor to ensure compliance with this PCP.
8. Areas for fuel storage, refueling, and servicing of construction equipment and vehicles should be at least 150 feet from the stream channel and all machinery fueling and maintenance occurs within a contained area. Overnight storage of vehicles and equipment should occur only in designated staging areas.
9. No surface application of nitrogen fertilizer should be used within 50 feet of any water of the State of Washington.
10. All disturbed areas should be planted with a native seed mix, and native shrubs and trees.
11. The boles and root wads of all felled cottonwood trees ($\geq$8 dbh) should be salvaged and distributed in riparian areas.
12. All riparian plantings should be monitored yearly for three years to ensure that finished grade slopes are at stable angles of repose and that woody plantings are achieving a minimum of 80% cumulative survival.
13. If the success standard specified above in Conservation Recommendation 12 above is not achieved, dead plantings are replaced to bring the site into conformance. If failed plantings are deemed unlikely to succeed, replacement plantings should be conducted at other appropriate locations in the project area.
14. FHWA should ensure that erosion control measures are monitored and are implemented as described above.

3.7 Statutory Response Requirement

Pursuant to the MSA (§305(b)(4)(B)) and 50 CFR 600.920(k), Federal agencies are required to provide a detailed written response to NOAA Fisheries' EFH conservation recommendations within 30 days of receipt of these recommendations. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. In the case of a response that is inconsistent with the EFH conservation recommendations, the response must explain the reasons for not following the recommendations, including the

scientific justification for any disagreements over the anticipated effects of the proposed action and the measures needed to avoid, minimize, mitigate, or offset such effects.

3.8 Supplemental Consultation

The FHWA must reinitiate EFH consultation with NOAA Fisheries if the proposed action is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920(l)).

4.0 REFERENCES

Allan, J.D. 1995. Stream Ecology: structure and function of running waters. Chapman and Hall, Inc., New York. 388 p.

Berg, L. (editor). 2001. Yakima subbasin summary. 2001. Draft report prepared for the Northwest Power Planning Council. 381 p.

Berg, L., and T.G. Northcote. 1985. Changes in territorial, gill-flaring, and feeding behavior in juvenile coho salmon (*Oncorhynchus kisutch*) following short-term pulses of suspended sediment. Canadian Journal of Fisheries and Aquatic Sciences 42:1410–1417.

Bishop, S., and A. Morgan, (eds.). 1996. Critical habitat issues by basin for natural chinook salmon stocks in the coastal and Puget Sound areas of Washington State. Northwest Indian Fisheries Commission, Olympia, WA, 105 pp.

Bisson, P.A, and R.E. Bilby. 1982. Avoidance of suspended sediment by juvenile coho salmon. North American Journal of Fisheries Management. 2:371–374.

Busby, P.J., T.C. Wainright, G.J. Bryant, L.J. Lierheines, R.S. Waples, F.W. Waknitz and I.V. Lagamarsino. 1996. Status Review of West Coast Steelhead from Washington, Idaho, Oregon and California. U.S. Dep. Commer., NOAA Tech. Memo. NMFS-NWFSC-27. 261p.

Busby, P.J., T.C. Wainwright, G.J. Bryant, L. J. Lierheimer, R.S. Waples, F.W. Waknitz, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Department of Commerce, NOAA Technical Memorandum. NOAA Fisheries-NWFSC-27, 261 p.

Campton, D.E., and J.M. Johnston. 1985. Electrophoretic evidence for a genetic admixture of native and nonnative rainbow trout in the Yakima River, Washington. Transactions of the American Fisheries Society 114:782–793.

Chapman, D., C. Pevan, T. Hillman, A. Giorgi, and F. Utter. 1994. Status of summer steelhead in the mid-Columbia River. Don Chapman Consultants, Inc., Boise, Idaho.

Ecology (Washington Department of Ecology). 1998. Lower Yakima River cleanup plan (a plan targeting sediments and pesticides). Publication No. 98-2026-WQ. December 1998.

Feist, B.E., J.A. Anderson, and R. Miyamoto. 1992. Potential impacts of pile driving on juvenile pink (*Oncorhynchus gorbuscha*) and chum (*O. keta*) salmon behavior and distribution. 66 p.

FHWA. 2003. Letter from Michael Kulbacki to Steven Landino.

Gregory, R.S. and T.G. Northcote. 1993. Surface, planktonic, and benthic foraging by juvenile chinook salmon (*Oncorhynchus tshawytscha)*. *Can.J.Fish.Aquat.Sci.*50:233-240.

Hastings, M. C., Popper, A. N., Finneran, J. J., and Lanford, P. 1996. Effects of low frequency sound on hair cells of the inner ear and lateral line of the teleost fish *Astronotus ocellatus*. Journal of the Acoustical Society of America 99:1759–1766.

Hruby, T. *et al.* 1999. Methods for assessing functions in riverine and depressional wetlands located in the lowlands of western Washington, part 1. Publication No. 99-115. Washington State Department of Ecology, Olympia, WA. 469 p.

Hruby, T. *et al.* 2000. Methods for assessing wetland functions, Vol. 2, Depressional wetlands in the Columbia Basin of eastern Washington, part 1. Washington State Department of Ecology, Olympia, WA.

Hockersmith, E., J. Vella, and L. Stuehrenberg. 1995. Yakima River radio-telemetry study: steelhead, 1989–1993. Annual report submitted to Bonneville Power Administration, Portland, Oregon. DOE/BP-00276-3.

May, C.W., R.R. Horner, J.R. Karr, B.W. Mar, and E.B. Welch. 1997. Effects of urbanization on small streams in the Puget Sound Lowland Ecoregion. Watershed Protection Techniques 2(4): 483-494.

McClure, M.M., E.E. Holmes, B.L. Sanderson, and C.E. Jordan. 2001. In press. A large-scale, multi-species status assessment: anadromous salmonids in the Columbia River Basin. Ecological Applications.

McQueary, P.L. 2003. Biological Assessment for OL-3549 - SR 24, SR 82 to Keys Road South Alignment Raised Profile. WSDOT, South Central Region.

Mitsch, W.J. and J.G. Gosselink. 2000. Wetlands, 3rd edition. John Wiley and Sons, New York. 920 p.

NOAA Fisheries. 1996. Making Endangered Species Act determinations of effect for individual or grouped actions at the watershed scale. 31 p.

NOAA Fisheries. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. NOAA Tech. Memo NMFS-NWFSC-35. 443 p.

NOAA Fisheries. 2000. Guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act. Website.
http://www.nwr.noaa.gov/1salmon/salmesa/4ddocs/final4d/electro2000.pdf

NOAA Fisheries. 2001. Endangered Species Act section 7 consultation biological opinion: San

Francisco–Oakland Bay Bridge, east span seismic safety project.

NRCC (National Research Council Committee on Protection and Management of Pacific Northwest Anadromous Salmonids). 1996. Upstream: salmon and society in the Pacific Northwest. National Academy Press, Washington, DC. 452 p.

Null, W.S., G. Skinner, and W. Leonard. 2000. Wetland functions characterization tool for linear projects. Washington State Department of Transportation, Olympia, WA. 30 p.

PFMC. 1999. Amendment 14 to the Pacific coast salmon plan. Appendix A: description and identification of essential fish habitat, adverse impacts and recommended conservation measures for salmon. Portland, OR.

Schueler, T. 1984. The importance of imperviousness. Water Protection Techniques 1(3): 100–113.

Servizi, J.A., and D.W. Martens. 1992. Sublethal responses of coho salmon (*Oncorhynchus kisutch*) to suspended sediments. Canadian Journal of Fisheries and Aquatic Sciences 49:1389–1395.

Sigler, J.W., T.C. Bjornn, and F. H. Everest. 1984. Effects of chronic turbidity on density and growth of steelhead and coho salmon. Transactions of the American Fisheries Society 113:142–150.

Spence, B.C., G.A. Lomnicky, R.M. Hughes, and R.P. Novitzki. 1996. An ecosystem approach to salmonid conservation. Website: http://www.nwr.noaa.gov/1habcon/habweb/ManTech/front.htm.

Waples, R.S. 1991. Pacific salmon, *Oncorhynchus* spp., and the definition of "species" under the Endangered Species Act. Marine Fisheries Review 53:11–22.

WDF (Washington Department of Fisheries) and Washington Department of Wildlife. 1993. Regional supplement to 1992 Washington State Salmon and Steelhead Stock Inventory. Appendix three; Columbia River stocks.

Wydowski, R.S., and R.R. Whitney. 1979. Inland Fishes of Washington. University of Washington Press, Seattle, WA. 220 p.

Yakama-Klickitat Fisheries Project. Website: http://www.ykfp.org/

WDF 1992 (1992 Washington State Salmon and Steelhead Stock Inventory)

APPENDIX I

In-Water Construction Monitoring Report

In-Water Construction Monitoring Report
SR 24, I-82 to Keys Road Project (NOAA Fisheries WSB-01-010)
NMFS Tracking Number 2001/00064

Start Date: _____
End Date: _____

Waterway: Yakima River

Construction Activities:

_____
_____
_____
_____
_____
_____

Number of fish observed: _____
Number of salmonid juveniles observed (what kind?): _____
Number of salmonid adults observed (what kind?):
_____

What were fish observed doing prior to construction?_____
_____
_____

What did the fish do during and after construction?
_____
_____
_____
_____

Number of fish stranded as a result of this activity: _____

How long were the fish stranded before they were captured and released to flowing water?
_____
_____
_____

Number of fish that were killed during this activity: _____

Send report to:
NOAA Fisheries, Washington Habitat Branch, 510 Desmond Dr. SE, Suite 103, Lacey, WA 98503